

# Herbicide use in pulse crop production

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# Herbicide Considerations

- Appropriate herbicide for weed spectrum
- Appropriate application timing
- Appropriate application rate for site
- Previous herbicide use history



# Herbicides labeled in Lentil and Chickpea

## Soil-applied

Spartan (CP only)

Prowl

Sonalan

Treflan

Dual

Outlook

Sencor (Lentil only)

Pursuit (Plus)

Sharpen

Valor (Fall)

## POST

Sencor (Lentil only)

Assure II

Select

Poast

Beyond (Clearfield)

# Herbicides labeled in dry pea

## Soil-applied

Prowl

Sonalan

Treflan

Dual

Spartan

Sharpen

Sencor

Pursuit (Plus)

Valor (Fall)

## POST

Basagran

Rezult

Pursuit

Raptor (+ Basagran)

Assure II

Select

Poast



# Herbicide Considerations

- Appropriate herbicide for weed spectrum

**KOCHIA**



**RUSSIAN THISTLE**



**WILD BUCKWHEAT**



**PRICKLY LETTUCE**



# Kochia and wild buckwheat control in dry pea

## Soil-applied

<b>Prowl</b>	<b>P-F</b>
<b>Sonalan</b>	<b>F-G</b>
<b>Treflan</b>	<b>P-F</b>
<b>Spartan</b>	<b>F-E</b>
<b>Sharpen</b>	<b>G-E*</b>
<b>Sencor</b>	<b>P</b>
<b>Pursuit (Plus)</b>	<b>P-F</b>
<b>Valor (Fall)</b>	<b>F-G</b>

## POST

<b>Basagran</b>	<b>P-G</b>
<b>Rezult</b>	<b>P-G</b>
<b>Pursuit</b>	<b>P</b>
<b>Raptor (+ Basagran)</b>	<b>P-G</b>

<b>E</b>	<b>90-100</b>
<b>G</b>	<b>80-90</b>
<b>F</b>	<b>65-80</b>
<b>P</b>	<b>40-65</b>



# Herbicide Considerations

- Appropriate herbicide for weed spectrum
- Appropriate application timing
  - Effective weed control
  - Crop safety

# Appropriate application timing

- Spartan and Sharpen: preplant or pre-emergence only. Both have good post activity on weeds but will severely injure crop.
- Basagran: contact herbicide at least 4 vegetative nodes on pea.
- Pursuit/Raptor: prior to 5 vegetative nodes on pea.

# Appropriate application timing

- Post-emergence graminicides most effective on small 1-3" tall annual grasses.
- Assure II has 60 day pre-harvest interval for pea and lentil.
- Select, Shadow, Section, Intensity etc. (clethodim) apply prior to bloom. warning of severe crop injury, delayed maturity and yield loss





**Chlorosis**





**Growth and Development delay**





**Harvest Delay with reduced yield and quality**





**Stand Reduction**



# Herbicide Considerations

- Appropriate herbicide for weed spectrum
- Appropriate application timing
- Appropriate application rate for site
  - Soil properties
  - Environmental conditions

from coarse to fine as noted in the following Soil Classification Chart, Table 1.

## SOIL CLASSIFICATION CHART

Table 1

<u>COARSE</u>	<u>MEDIUM</u>	<u>FINE</u>
Sand	Sandy clay loam	Silty clay loam
Loamy sand	Sandy clay	Silty clay
Sandy loam	Loam	Clay loam
	Silt loam	Clay
	Silt	

### Influence of Soil type, organic matter and pH on Spartan Use Rates and Crop Response

Soil organic matter content can vary widely and independently of soil type and requires an accurate analysis of representative soil samples to determine its content.

Soil pH also exerts a dramatic affect on sulfentrazone availability in the soil solution. As soil pH increases, sulfentrazone availability increases. Accurate soil pH information will require an accurate analysis of representative soil samples.

The total amount of sulfentrazone available in solution, in any given soil, is determined by the interaction of soil type (clay content), % organic



Do not incorporate to depths greater than 2 inches.

## **DRY PEAS (25.0)**

**Only for use on Chickpea and Dry Field Pea**

**Table 11**

<b>Spartan 4F Use Rate Table (Dry Peas)</b> Fall or Spring Early Preplant, Preemergence, and Preplant Incorporated Applications			
<b>Broadcast Rate</b>	<b>Fluid Ounces Spartan 4F per acre</b>		
	<b>Soil Texture</b>		
<b>% Organic Matter</b>	<b><u>Coarse</u></b>	<b><u>Medium</u></b>	<b><u>Fine</u></b>
<1.5%	2.25 – 3.0	3.0 – 4.5	3.0 – 4.5
1.5-3.0 %	3.0 – 4.5	3.75 – 6.0	4.5 – 6.0
>3.0 %	3.75 – 6.0	4.5 – 6.75	5.25 – 8.0
Refer to the previous information on soil types under the COARSE, MEDIUM, and FINE categories			
Use higher rates for soils of pH less than 7.0 and lower rates for pH greater than 7.0 within the rate range.			

**Early Preplant and Fall Applications (For use only in ND, SD, MT, MN, WY, CO, NE, KS, WI, MI, OR, ID, WA, OR, MT) (25.1)**

Spartan 4F may be applied in the fall as a preplant treatment to control or suppress weeds prior to planting the following spring. Spartan 4F





**Stand Reduction**



# Environmental Factors

- Cool wet saturated soil can greatly increase crop injury from many soil active products.
- Hot humid air can increase crop response from post-emergence applications of grass herbicides like Poast.

# Herbicide Considerations

- Appropriate herbicide for weed spectrum
- Appropriate application timing
- Appropriate application rate for site
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**Chlorosis and growth deformity**





FLAX

CAMELIN  
A

PEA

CHICKP  
EA

LENTIL

SAFFLOW  
ER

PowerFlex 2X

Maverick 2X





**Herbicide Carryover/Rotational Crop Plant-back Study Joplin, MT**



# Weeds listed as controlled by Sharpen

Bedstraw, catchweed

**Buckwheat, wild**

Canola, volunteer

Cocklebur

Flixweed

Horseweed

**Kochia**

**Lambsquarters**

**Lettuce, prickly**

**Mallow, common**

Mallow, Venice

Mustard, wild

Nightshade, EB

Nightshade, hairy

Pennycress, field

Pigweed, redroot

Ragweed, common

Ragweed, giant

Shepherdspurse

Smartweeds

Sunflower

**Thistle, Russian**

# **Lentil weed control with pre-emergence herbicides**

- “CDC Impress CL” Clearfield medium green
- Seeded May 3, 2011 70 lb/a
- Double disc no-till drill, 10 inch row spacing
- Fallow 2010, Spring wheat 2009
- Pre-emergence herbicide treatments
  - Applied same day as seeding
  - Applied 10 days following seeding

# Lentil weed control with pre-emergence herbicides

Treatment	Rate	Kocz	Prle	Coma	Yield
-----% control-----					Bu/A
Untreated		0	0	0	21.8
ROM	22 oz	53	70	30	31.3
Sharpen + ROM	0.75oz + 22oz	70	94	80	30.6
Sharpen + ROM	1.5 oz + 22oz	68	100	79	26.6
Prowl H2O + Sharpen + ROM	1.5 pt + 0.75 + 22 oz	84	88	86	27.8
LSD (0.05)		16	12	22	4.64

•Weed control evaluated on July 20; all treatments applied PRE same day as seeding



# Lentil weed control with pre-emergence herbicides

Treatment	Rate	Kocz	Prle	Coma	Yield
-----% control-----					Bu/A
Untreated		0	0	0	25.3
ROM	22 oz	63	68	36	30.5
Sharpen + ROM	0.75oz + 22oz	79	98	92	28.8
Sharpen + ROM	1.5 oz + 22oz	84	98	95	28.5
Prowl H2O + Sharpen + ROM	1.5 pt + 0.75 + 22 oz	95	100	98	29.1
LSD (0.05)		10	13	6	4.09

•Weed control evaluated on July 20; all treatments applied PRE 10 Days after seeding

Bozeman, MT 2011

# Dry pea weed control with pre-emergence herbicides

Treatment	Rate	Kocz	Prle	Coma
-----% control-----				
Untreated		0	0	0
ROM	22 oz	60	70	29
Spartan + ROM	2 oz + 22 oz	94	99	91
Sharpen + ROM	1.0oz + 22oz	92	99	97
Sharpen + Spartan + ROM	1 oz + 2 oz + 22oz	94	100	98
Prowl H2O + Sharpen + ROM	1.5 pt + 1.0 + 22 oz	94	98	95
LSD (0.05)		4	3	6

•Weed control evaluated on May 20 (7 DAT); all treatments applied PRE



# Dry pea weed control with pre-emergence herbicides

Treatment	Rate	Kocz	Prle	Coma	Yield
-----% control-----					Bu/A
Untreated		0	0	0	39.2
ROM	22 oz	55	63	45	39.8
Spartan + ROM	2 oz + 22 oz	92	98	97	43.1
Sharpen + ROM	1.0oz + 22oz	88	100	95	40.5
Sharpen + Spartan + ROM	1 oz + 2 oz + 22oz	93	98	100	40.9
Prowl H2O + Sharpen + ROM	1.5 pt + 0.75 + 22 oz	98	100	100	41.8
LSD (0.05)		12	7	22	3.26

•Weed control evaluated on July 20; all treatments applied PRE

# Clearfield Lentil

- **Use Beyond herbicide (imazamox)**
- **4 fl oz + NIS + N**
- **Lentil 2- to 6-leaf stage**
- **Ideally before weeds exceed 3"**
- **Consider Sonalan or Prowl soil-applied followed by Beyond for more complete weed control and resistance management**



# Clearfield Lentil

- Mustards
- Pigweed
- Lambsquarters
- Nightshade
- Marshelder
- Prickly lettuce
- Russian thistle (supp)
- Mallow (supp)
- Volunteer canola
- Foxtail
- Wild oat
- Bromes

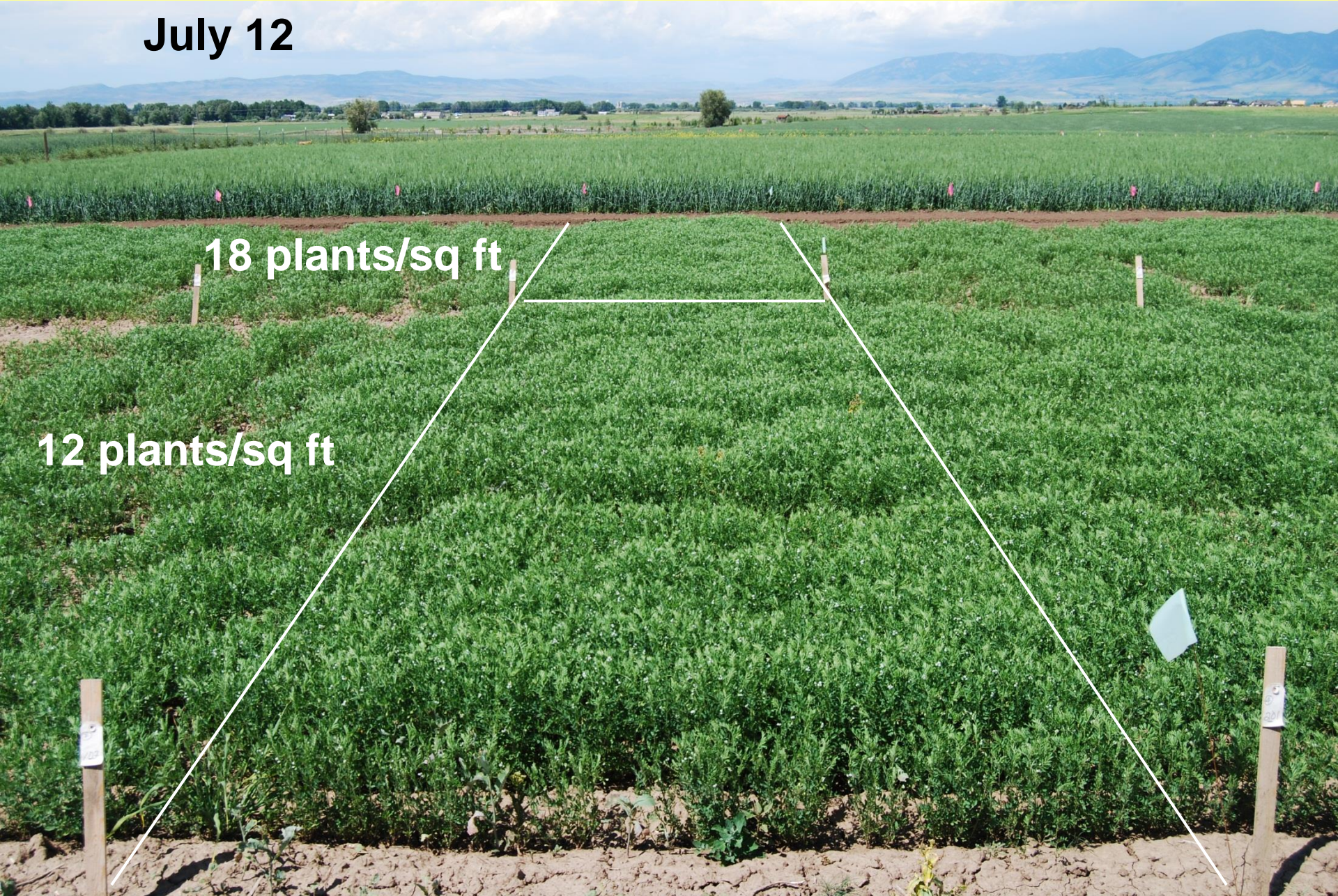
**Weakness: kochia, wild buckwheat\***

# **Effect of lentil seeding rate, seeding date, and herbicides on lentil production**

- **Background**
- **Every herbicide causes some lentil injury**
- **Injury could be chlorosis, stunting, stand reduction**
- **Can we compensate for stand reduction by increasing seeding rate?**



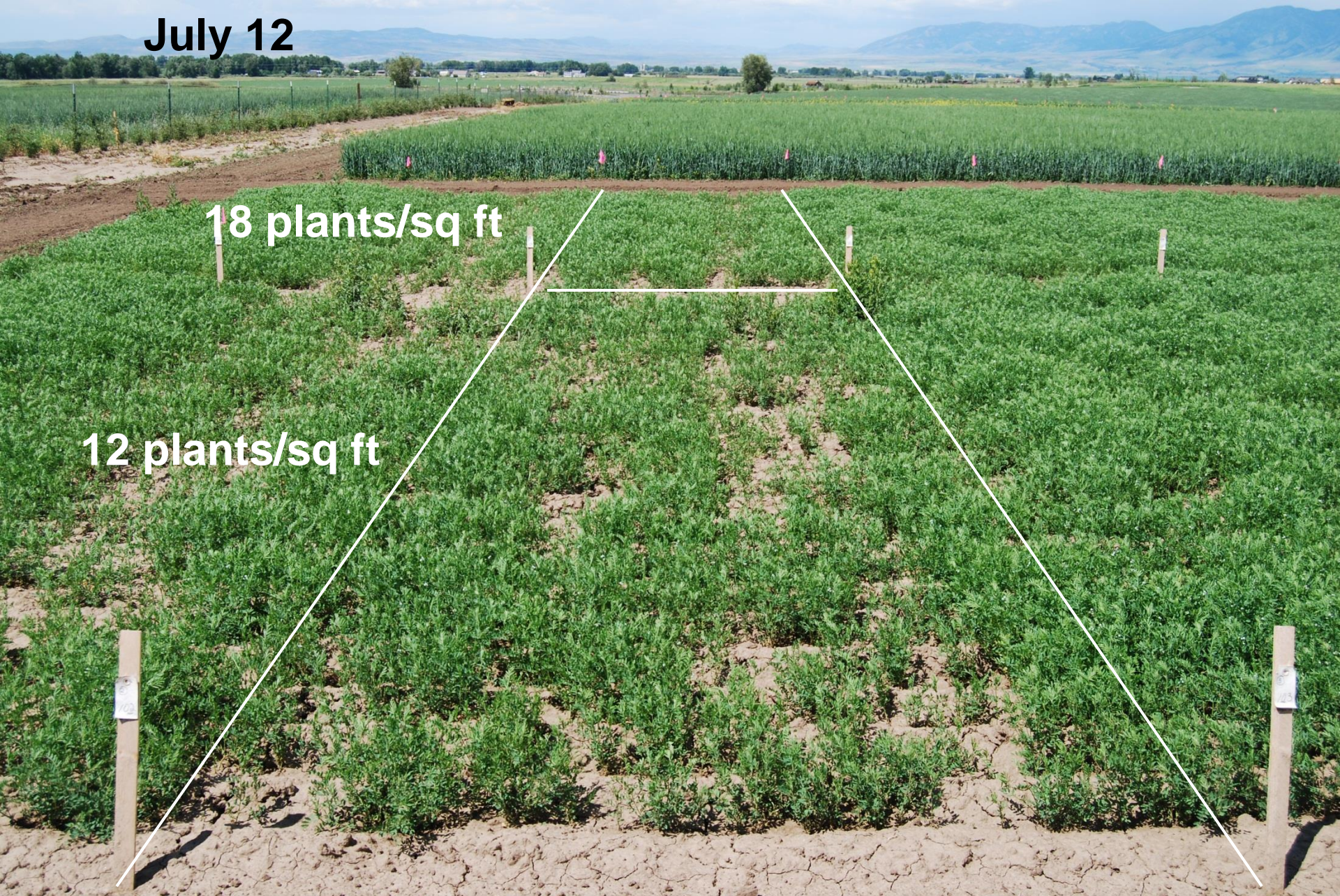
**July 12**



**Roundup Original Max 1 pt**



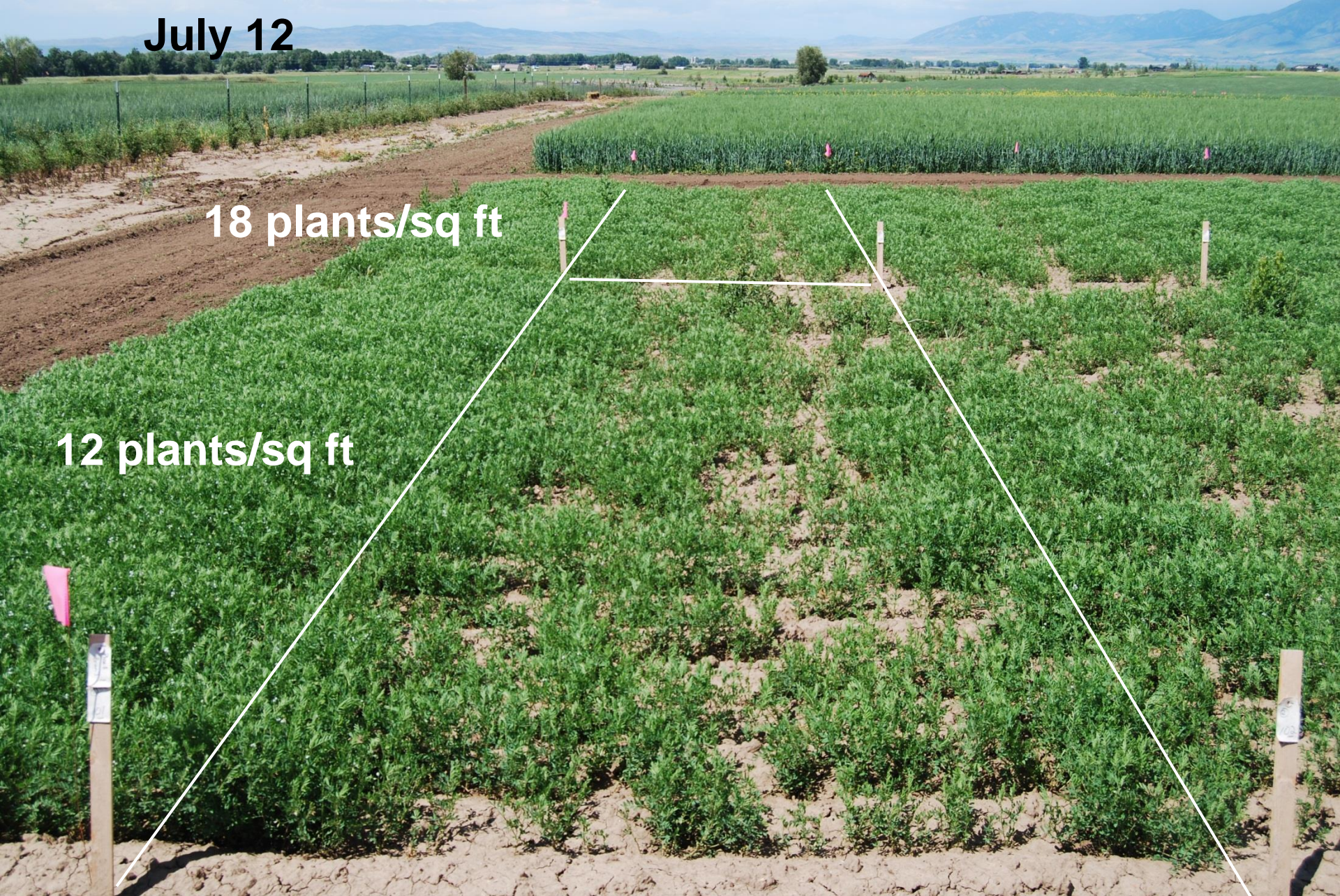
**July 12**



**Prowl H2O 3 pt**



**July 12**



**18 plants/sq ft**

**12 plants/sq ft**

**Prowl H2O 3 pt + Sharpen 1 oz**



**August 1**

**18 plants/sq ft**

**12 plants/sq ft**

**Roundup Original Max 1 pt**





**August 1**

**18 plants/sq ft**

**12 plants/sq ft**

**Prowl H2O 3 pt**



**August 1**

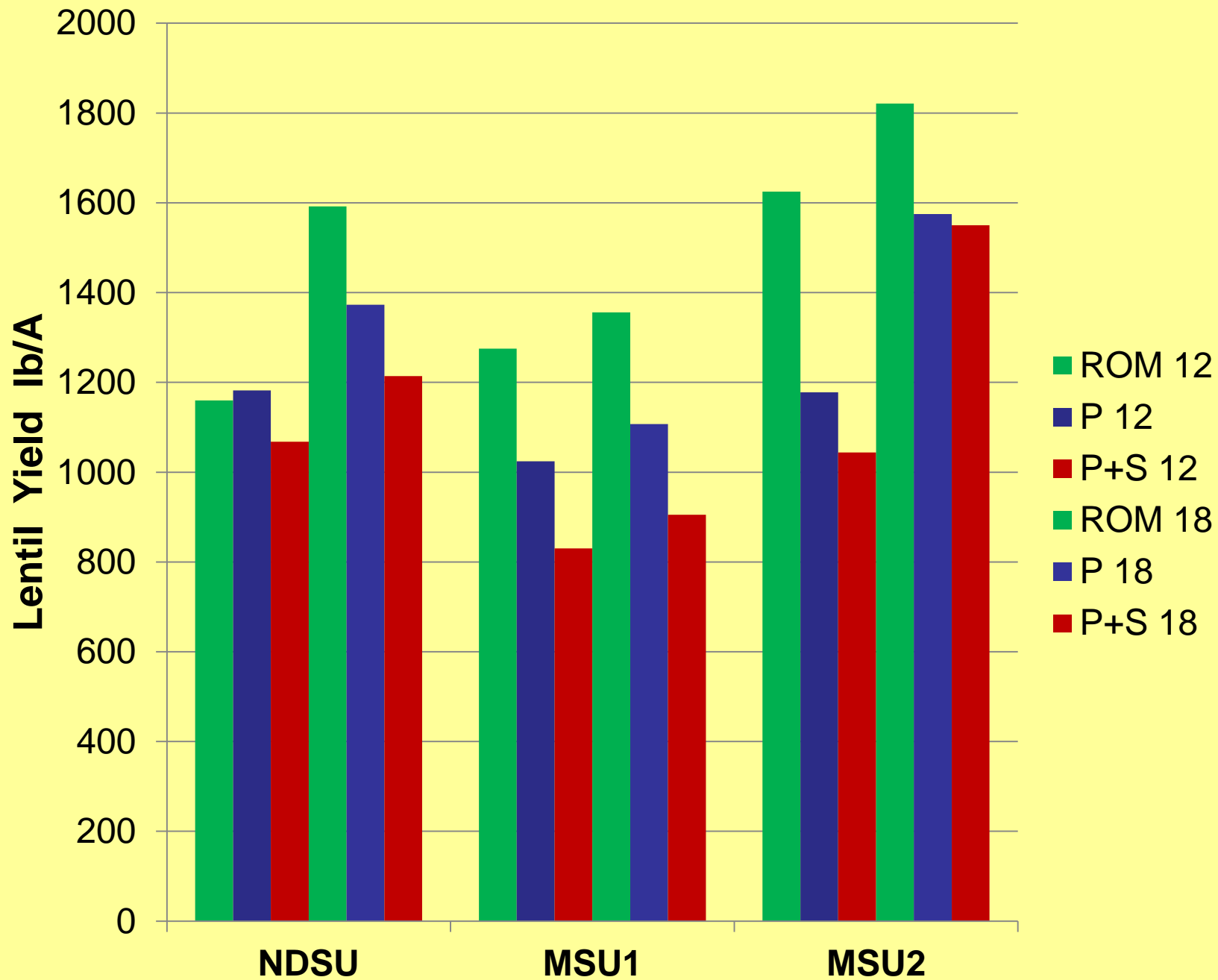
**18 plants/sq  
ft**

**12 plants/sq ft**

**Prowl H2O 3 pt +  
Sharpen 1 oz**







# Effect of lentil seeding rate, seeding date, and herbicides on lentil production

## Assumptions:

- Pennell lentil, 7000 seeds/lb, 24¢/lb
- Market Price: 11¢/lb
- Averaged over seeding dates and herbicides

			Seed cost	Yield	Gross return
Seeds/ Sq ft	Seeds/ A	lb/A	\$/A	lb/A	\$/A
12	548856	78.4	18.8	1535	168.85
18	823284	117.6	28.2	1752	192.72



## Impact of herbicides and seeding rate on lentil yield

	12 plants/ft <sup>2</sup>	18 plants/ft <sup>2</sup>	
<b>Minot 2006</b>	<b>1535</b>	<b>1752</b>	
<b>Minot 2011</b>	<b>1117</b>	<b>1405</b>	
<b>Bozeman 2011a</b>	<b>1065</b>	<b>1158</b>	
<b>Bozeman 2011b</b>	<b>1458</b>	<b>1731</b>	
<b>Average</b>	<b>1294</b>	<b>1512</b>	<b>218 lb difference</b>

## Impact of herbicides and seeding rate on lentil yield

	12 plants/ft <sup>2</sup>	18 plants/ft <sup>2</sup>	
Minot 2006	1535	1752	\$14.47
Minot 2011	1117	1405	\$22.28
Bozeman 2011a	1065	1158	\$0.83
Bozeman 2011b	1458	1731	\$20.63
			<b>\$14.55</b>
Average	1294	1512	218 lb difference



# QUESTIONS

